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Report

Attitude and Self-Concept Change Following Behavior Change: A Research Project on Mothers' and Soldiers' Behavior and Attitudes[1]

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Activities, attitudes and self-descriptions of 60 women (during and after pregnancy) and of 110 recruits (during and after service) were recorded at five points in time from 1982 to 1984. First results from behavior-attitude correlations and causal analyses are reported.

In Mummendey's (1983) review of the German attitude-behavior research the study of the attitude-behavior relation was conceived of as a major topic of social psychology both in the United States and in Europe. In this research field the prediction of behavior from attitude is largely the rule. The history of attitude-behavior research, be it in a more basic scientific tradition or in applied fields of psychology, clearly shows a preponderance of what we can call an "idealistic" or "cognitivistic" perspective: Just like in the tradition of German idealistic philosophy (Fichte, Schelling, Hegel, Kant), it is the ideas or the cognitions that are held, at least in great part, to be responsible for observable concrete behaviors. The social psychology of attitude and behavior is by far governed by this "idealistic," one-way research perspective which seems to have so many practical advantages. Fishbein and Ajzen's (1975) model of the attitude-behavior relationship can be regarded as typical for the fundamental way of approaching the problem and for the way of developing the research process, i.e., to take attitudes as predictors and to add some more psychological variables to the attitude side of the prediction formula (personal, situational, normative variables) for an improved forecast of what is intended or would actually be done. Although much more differentiated and complicated, these approaches to the attitude-behavior problem seem to be follow-ups to Wicker's (1971) "third-variables" approach in attitude-behavior research. There is no doubt that all the third-variables attempts to obtain better predictions of social behaviors from social attitudes combined with a manifold of additional variables have actually been sufficient in overcoming the magic .30 order

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of magnitude of attitude-behavior correlations stated in Wicker's (1969) review. But the more additional third-variables that are necessary for successfully predicting concrete behaviors, the less meaningful it is to speak of "attitude"-behavior research.

For instance, if we take into consideration that important progress in predicting behavior from attitude was made by considering attitudes that are directed to the behavior in question itself, i.e., behavior-related attitudes are taken as predictors; or if we look at Fazio and Zanna's (1981) successful consideration of direct experience with the attitude object in question, we learn that the original idealistic question of predicting behaviors from attitudes (in the sense of a non-behavioral, mental construct of attitude) has not been stated optimally. It seems that the third-variables approach itself has brought up some arguments against a further overemphasis of the attitude-behavior direction of determination - and in favor of a perspective stressing that there is a permanent mutual influence process of attitude and behavior variables. In some cases this on-going process of attitude-behavior interaction might be more adequately investigated if the conventional attitude-behavior perspectives were taken, though in other cases it should be studied from the opposite perspective, i.e., that behavior determines attitude. (Although there seems to be an enormous amount of investment in psychological modeling and in discussing very complex processes of interaction between cognitive and behavioral, or "actional" aspects of humans, it is very complicated to represent complex models of a certain degree of totality within empirical-psychological research and to investigate and test them with the tools of psychological methodology.) Hence, as a first step toward counterbalancing the traditional bias of attitude-behavior research, the relationship of attitudes and behaviors should be investigated from the behavior-oriented point of view.

In experimental social psychology, too, there exist a considerable number of behavior-oriented studies that take overt behaviors as predictors of attitudes. Some of the research approaches starting from behavior and not from attitudes are well known, although they are usually not designated as attitude-behavior studies:

- Traditional attitude-change research within the forced-compliance paradigm (Festinger & Carlsmith, 1959) looks at attitude change following behavior change; this concerns both the cognitive-dissonance view as well as alternative interpretations (Bem, 1972; Tedeschi & Rosenfeld, 1981).
- Intergroup studies on prejudice, especially in the tradition of the "contact hypothesis" (Amir, 1976), show how intergroup attitudes may be changed in a positive or negative way by the amount and quality of contact with members of outgroups.
- Evidence from role-playing experiments and applications in diverse fields of social and clinical psychology (e.g., Elms, 1967) have shown how attitudes are changed in persons who engage in performing new behaviors.
- Studies in human ecology or ecological psychology have demonstrated attitude change effects in persons who enter new environments such as educational settings (Dann, Cloetta, Müller-Fohrbrodt & Helmreich, 1978) or residential settings (Stokols & Shumaker, 1980).

A further method of studying attitude-behavior relations in a less traditional, but in other fields of psychology well-established way is to regard behavior and attitudes as ongoing processes. Attitude-behavior studies are often one-shot studies in which measures of attitude and behavior assessed only once are compared. Only in some approaches, e.g., Kahle & Berman's (1979) cross-lagged panel correlation studies, are the process features of attitude and behavior explicitly recognized. In the present study, behavior and attitude are conceived of as changing over time, and the behavior-attitude relationship is investigated by relating behavior change to attitude change.

A final theoretical issue is that we see no principal difference in whether attitudes are directed toward social objects outside the person (like political topics or other persons) or toward the persons themselves (i.e., self-concepts). The functional equivalence of attitudes and self-concepts is inferred, for instance, from the readily observable identity of attitude and self-concept assessment methods (Mummendey, 1979). Consequently, in the present study it is assumed that behavior change results in self-concept change as well as in a change in attitudes toward traditional attitude objects.

Method

Design of the Study

A study was designed in which attitude and self-concept change would be expected to occur in accordance with behavior change outside the laboratory. Since such changes should be observed over a longer period of time, a longitudinal study was planned with persons who experience change in their everyday behaviors for at least a year. As two groups in which this would be relatively uniformly the case, we chose women who give birth to their first child and men drafted into the military service.

In this study, behavioral and attitudinal indices should be assessed before and after the critical, behavior-changing events (here: childbirth and recruitment), thus giving the study the character of a kind of "natural experiment" (McDavid & Harari, 1968); the changes in the independent variables are thus not deliberately manipulated but only systematically observed by the researcher. This natural-experimental feature of a field-research-type study is typically associated with a number of methodological weaknesses, which we counteracted by various research strategies:

- To control for testing effects (sensu Campbell & Stanley) in a repeated measurement design, a longitudinal control-group design of the type "Control of Testing Effects per Cohort by Simultaneous Application of Longitudinal and Cross-Sectional Sequences" (Baltes, 1968, Table IV) was applied, in which the longitudinal sample of subjects (L) is combined with independent control groups as follows:

L1	L2	L3 . . .
C1	C2	C3 . . .

Here, the numbers represent the subjects' "developmental stages," e.g., L1 and C1 are both groups of mothers at the same stage of pregnancy, but C1, C2 . . . are independent control samples.

- To control for subject-specific events, nearly identical tests were given to mothers and soldiers, i.e., to two very diverse samples of persons experiencing two very different behavior-changing events (childbirth, recruitment).
- Since it could not be expected that the impacts of the behavior-changing events on the subjects' attitudes be homogeneous, a set of cognitive third variables was simultaneously assessed which represent different judgments of the subjective meanings of motherhood or recruitment, respectively.

As can be inferred from the foregoing, the study shows some apparent similarity with those on "critical life-events" (cf. Dohrenwend & Dohrenwend, 1974). Thus, the attention paid to subjective cognitive indicators could be seen as an attempt to consider the subjects' coping processes. But, unlike critical life-event or coping studies, in this project stress was given to the assessment of ongoing changes of overt behaviors and the association of these behavioral changes with attitude changes. For reasons of economy only, in some parts of the data interpretation, the critical life-events themselves are regarded as breaking points that represent more or less clear-cut behavioral change at a single point of the behavioral continuum over time.

Preliminary Investigation

In semi-standardized interviews nineteen mothers and ten ex-soldiers were studied regarding changes in behaviors and attitudes experienced in the period of life here in question. The mothers reported behavior changes especially concerning leisure-time behavior, planning and organization of time budgets, home work (increase), professional work (decrease), social contacts, interaction with partners, and division of labor. As attitude changes after the birth of the first child there appeared, above all, changes in attitudes toward "profession and household," and "politics and society." Finally, their self-concepts concerning "responsibility, being needed" and "attachment, freedom" turned out to have changed. Behavior changes after the men's service time were reported for social behaviors (interaction with parents, girlfriend/wife etc.) and for good manners (decrease); in most cases there were financial losses and increases in alcohol consumption. Attitude changes as inferred from the interviews had mainly to do with the army itself (indifferent attitudes toward the army shifted to the negative side), and finally some self-concept changes concerning assertiveness, self-esteem, and empathy (all into the negative direction) were reported. Hence, from the preliminary interviews it could be summarized that both critical events, childbirth and recruitment, could be regarded as points at which important behavior changes take place, and that attitude and self-concept changes would probably appear in the main study.

Subjects and Measurements

The women's longitudinal group consisted of 60 pregnant women, mean age 26, with high school education, most of them well-motivated for participation. The control groups consisted of 30 women each. All women were tested individually at home from September 1982 to June 1984. The five points of measurement time were (1) four months before childbirth, (2) four weeks before and (3) six weeks after delivery, (4) six months after and (5) twelve months after childbirth.

The men's longitudinal group consisted of 110 recruits, mean age 20, with elementary school education, most of them only moderately motivated, as can be seen from their experimental mortality: 110/96/90/70/48; the control groups consisted of 80 recruits each. All men were tested in small groups within their military units, from December 1982 to October 1984. The five points of measurement time were (1) four weeks before recruitment, (2) during the second month of service (i.e., during basic military training), (3) during the fourth/fifth month (i.e., after basic military training), (4) during the 14th/15th month (i.e., shortly before dismissal), (5) two or three months after dismissal (questionnaires mailed).

Thus, for the women's sample, two measurements were performed before the critical, behavior-changing event, but for technical reasons, especially problems of data security laws surrounding recruitment, in men only one measurement could be carried out before recruitment. Another difference between the two groups concerned the final measurement: while mothers continue to be mothers, and hence there is no post-measurement, the fifth measurement of soldiers' attitudes is at a point at which they have already left the army and returned to their former environments or activities.

Measurement of Behavior

The time spent in activities and with interaction partners served as behavior measures at the five points of assessment. All time-based data were transformed into hours per month. To develop a taxonomy of activities, facet theory (cf. Levy & Guttman, 1975) served as a frame of reference. According to previously tested mapping sentences for "activities of mothers" and "activities of soldiers" with the three facets "Leisure time/work," "Alone/together," and "At work/at home/outside home," 20 activities for women and 15 for men were selected. Apart from that several mother-specific activities like feeding the baby and some military-specific behaviors like caring for equipment were selected. Similarly, the time spent with interaction partners (seven for women, nine for men), such as parents, spouse, colleagues etc., was assessed for each person at the five measurement times.

Measuring the Subjective Meaning of Behavior Change

According to Filipp's (1981) rating method for estimating the "subjective event parameters" of individuals experiencing critical life-events, the subjective meaning

of motherhood or military service was inquired by rating scales of "Evaluation," "Controllability," "Meaningfulness," and "Challenge." Women were also asked for ratings of "desirability of motherhood," "planning of birth," and "inner discussions" about becoming a mother.

Attitude Measurement

Attitudes were assessed for "activities," "interaction partners," "conservatism," and "values." The identical lists of activities that were rated for time spent had to be rated for positive/negative evaluation. The women's attitudes toward interaction partners were assessed by applying Riemann's (1983) repertory-grid technique for the measurement of attitudes; in this modified use of the technique, where a reliability of .81 and a high convergent validity was revealed, the attitude objects served as elements of the grid. In soldiers, direct ratings and pair comparisons of the men's interaction partners were gathered. Thus, in both samples, attitude scores and attitude structures could be assessed. "Conservative" attitudes were measured by using an actualized German version of the Wilson-Patterson *Conservatism Scale* (Schiebel, Riemann & Mummendey, 1984) resulting in an overall conservatism score (Cronbach's alpha = .90) and four subscores relating to "Authoritarian education/political conservatism," "Rejection of women's liberation," "Rejection of foreigners," and "Rejection of sexual freedom." Finally, Rokeach's (1968) lists of "Instrumental values" and "Terminal values" served as attitude objects in both samples (retest reliabilities are about .90); according to factor analyses of the German-version forms, two scores for both of the 18-item lists were regarded besides the single values, "Norm-orientation" and "Open-mindedness" as "Instrumental values," and "Secure and pleasant life" and "Happiness and peace" as "Terminal values." Factor analyses in different samples show good factorial validities for conservatism and values scores (see Mummendey, Schiebel & Sturm, 1985e).

Self-Concept Measurement

The mothers and soldiers rated themselves on 56 bipolar adjective rating scales which form a multidimensional self-rating system developed by Mummendey, Riemann and Schiebel (1983) on the basis of a CPI self-rating set of scales. The six self-rating dimensions derived by using MDS methodology and a facet-theory-guided organization of the data are "Achievement," "Self-confidence," "Flexibility," "Sociability," "Tolerance," and "Discipline"; an overall score representing an overall positive self-image or self-esteem indicator was also computed (Cronbach's alpha = .84, high factorial validity; see Mummendey, Schiebel & Sturm, 1985c). In the women's sample, as a more transparent technique for self-description over time, the *Adjective Generation Technique* (Allen & Potkay, 1983), was applied which gives qualitative descriptions of the real and ideal selves as well as respective quantitative scores.

Results

Behavior Change

Multivariate analyses of variance showed significant changes in time spent for activities and with interaction partners, both in mothers and soldiers. (Here, as in the following, MANOVAs were applied since ratings were (multi)normally distributed, and Geisser-Greenhouse F-Tests indicated homogeneity of variances.) Hotelling's T^2 as a global test for differences between the longitudinal and control samples was insignificant for the mothers' behavior data but significant for the soldiers' activity data. Thus, activity changes over time are interpreted here only for the female sample. Figure 1 shows (in a schematic representation) how time spent for certain activities varies: for instance, U-shaped curves for time spent at work and with colleagues, and N-shaped curves for activities performed at home. (In the longitudinal group of soldiers, nearly all activities also show a U-shaped development over the five measurement times.)

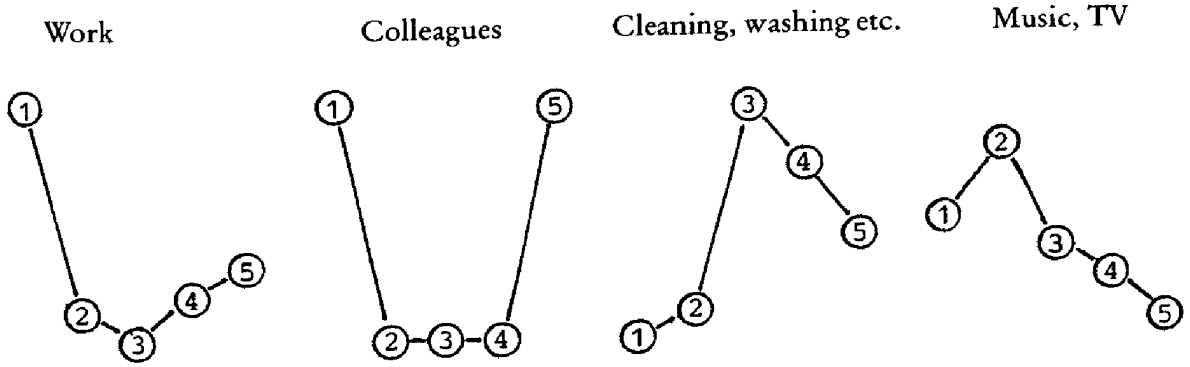

Figure 1
Schematic representation of mothers' activity changes over the five measurement times (ratings of time spent, hours per month; childbirth is between points of time 2 and 3)

Subjective Meaning of Behavior Change

All MANOVA F-values showed significant changes in the subjective event parameters that indicate the subject's attributions of meaningfulness to motherhood or military service. In these cognitive variables, no differences between longitudinal and control groups were observed. Figure 2 gives a schematic representation of the processes of the significantly changing single-scale values (two for the mothers, one for the soldiers). The meaningfulness of motherhood continually increases, while the degree of "inner discussions" about motherhood decreases after childbirth; in the soldiers, the "challenge" of army service (rated from "stimulating" to "paralyzing") continually decreases (toward "paralyzing") but shows a minor improvement when army service is over.

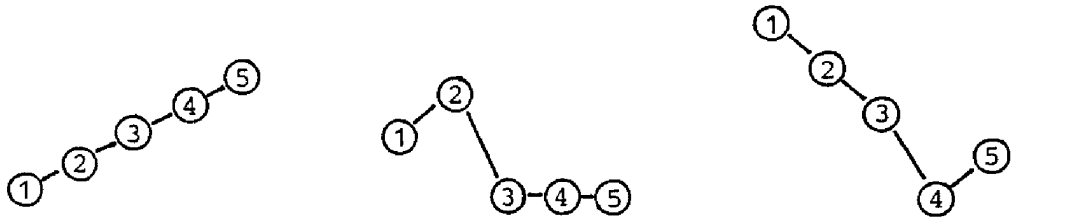

Figure 2
Schematic representation of changes in mothers' and soldiers' subjective cognitions/evaluations of the behavior-changing events (childbirth is between 2 and 3, recruitment between 1 and 2)

Attitude Change

Evaluation of Activities

As the MANOVAs indicate, the whole range of evaluations of the mothers' and soldiers' everyday activities changes over time. No major longitudinal control-group differences are observed. In the mothers, most of the activities concerning social contacts are given lower values after delivery except "sleeping"; at the end of the study there is a slight improvement of those evaluations, except for "being together with partner" (see Figure 3).

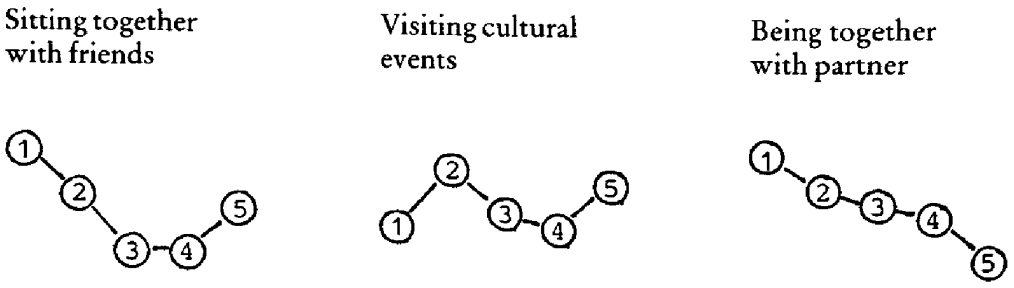

Figure 3
Schematic representation of changes in mothers' evaluations of their everyday activities at the five points of measurement (childbirth is between 2 and 3)

The soldiers' evaluations of their activities (such as "sport," "reading," and "further education") show U-shaped developments, i.e., evaluations are highest before and after the service time.

Evaluation of Interaction Partners

In women there is no overall change in the evaluations of the persons with whom the subjects used to interact. In men, however, there are significant changes, but these will not be interpreted since the T^2 values indicated longitudinal control-group differences for the soldiers' direct evaluations of their interaction partners. (For all further reported data no longitudinal control-group differences of remarkable size appeared.)

Individual Attitude Structures

Starting from the assumption that persons may have differing attitude structures, individual structures of attitudes toward interaction partners were obtained by using MDS methodology. The mothers' evaluations of the twelve attitude objects (father, mother, girlfriend, partner, etc.) as obtained by the *Rep-Grid-Test* were transformed into similarity measures[2] in order to be comparable with the soldiers' paired-comparison evaluations of their ten attitude objects. The five similarity or distance data matrices (according to the five measurement times) of each subject were then analyzed by Lingoes' (1973) MINISSA program. The five resulting coordinate matrices for each individual served then as an input for Borg and Lingoes' (1977) PINDIS program, and the resulting two-dimensional representations were interpreted. All five individual configurations X_i were compared with an "average" (intraindividual) centroid configuration Z, and communalities between Z and X_i were assessed by computing $r^2(Z, X_i)$. Leutner and Borg's (1983) coefficient of alienation c′ was computed to describe the correspondence between two configurations each. When we described all individual configurations of evaluations of interaction partners in this way, a lot of information on changes in individual attitude structures became evident that cannot be reported here in detail. (Figure 4 gives an example of change of one individual's structure.) In general, there are large interindividual differences in the (intraindividual) average correlations between all time-of-measurement structures. A clearly observable break in the individual attitude structures after childbirth or recruitment occurs only in a few subjects. In the soldiers' sample, the c′ measures for the second, third, and fourth measurements (i.e., during service time) indicate for most of the persons higher intercorrelations than those from the first and fifth measurement, thus supporting the assumption that individual attitude structures are changed during military service.

2 Attitude objects served as elements of the grid; they were rated according to the grid constructs on three-point rating scales. The euclidic distances over all fifteen grid constructs served as measures of similiarity between two attitude objects (grid elements) each.

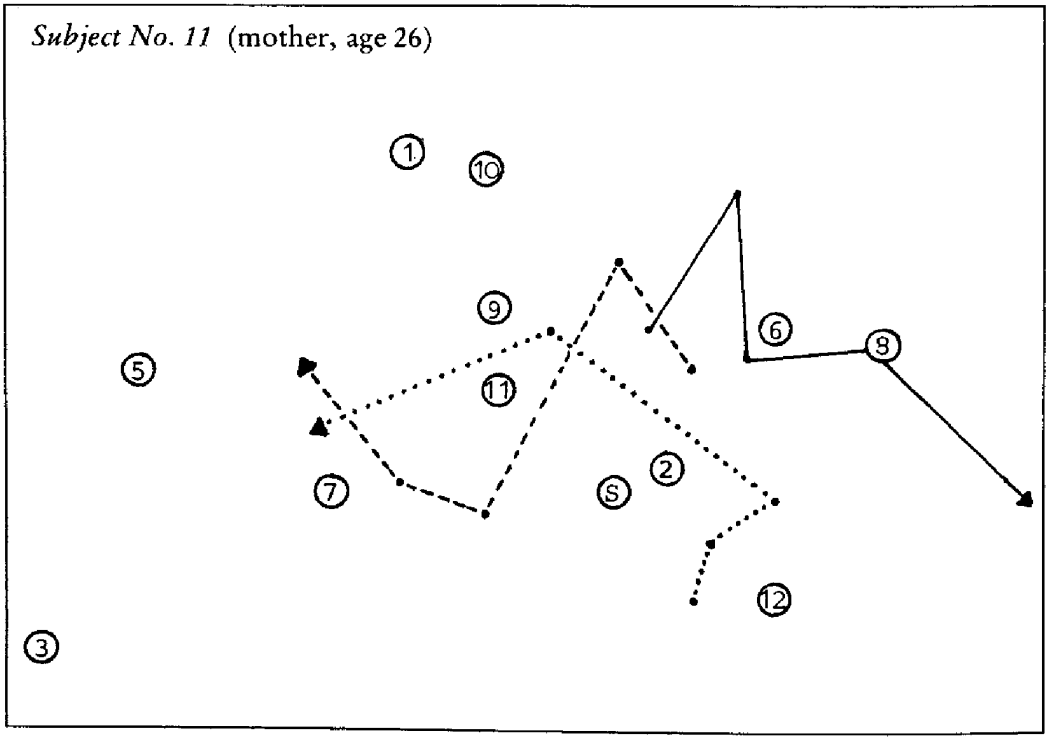

Figure 4

Intraindividual change of attitude structure: Movements of three selected attitude objects (interaction partners of mothers): 'own person' (····), 'child' (– – – –), and 'partner' (——). The numbers indicate the object centroids, 'S' stands for 'own person.' The black triangles mark the points of the last (fifth) measurement.
1 = father 2 = best girl friend 3 = neighbors S = self 5 = colleagues
6 = mother 7 = other children 8 = partner 9 = other mothers
10 = good friends 11 = own child 12 = parents-in-law

Group Solutions of Individual Attitude Structures

With the same methodology described above, aggregations of individual attitude structures were attempted which relate to a hypothetical "average" individual attitude structure per time of measurement (these will in fact not be congruent with any one real individual structure). All individual two-dimensional MINISSA solutions per point of measurement were combined by PINDIS to a centroid configuration, for mothers and soldiers, respectively. Fit-values indicated that the individual attitude structures, in soldiers even better than in mothers, were more congruent than would be expected by chance. Again, there was more correspondence between the configurations produced after recruitment as compared with the measurements before. When the configuration of the first measurement was then taken as a target configuration, it was shown that the fit-values to this configuration decreased step by step in the mothers' but not in the soldiers' sample. On the other hand, there are individuals who showed clearly changing attitude

structures while the "group solution" remained unchanged over time. (For a much more detailed report, see Mummendey, Schiebel & Sturm, 1985c.)

Conservative Attitudes

Conservatism scores changed over the time of investigation, as indicated by the MANOVAs, in men but not in women, all data being interpretable because of the absence of longitudinal control-group differences. Taking the overall measure of conservatism into consideration, there are also significant changes in the mothers' sample indicating that general conservatism increases before childbirth and then remains more or less unchanged; the same development of overall conservatism is observed in soldiers, whose conservatism scores are generally clearly higher than those of the mothers. In the soldiers' group, ANOVAs for repeated measurements showed significant increases of the conservatism subscore "Rejection of women's liberation" (see Figure 5). When the above-described subjective event parameters, i.e., the ratings of subjective meaning and evaluation of motherhood or recruitment, were included as third variables in the analyses, there were significant time × third-variable interaction effects on women's conservatism scores only in five percent of the ANOVAs. In the men's group some more interactions with third variables appear, but on the whole it can be said that the influence of those cognitive variables on conservatism during motherhood or recruitment seems to be rather weak.

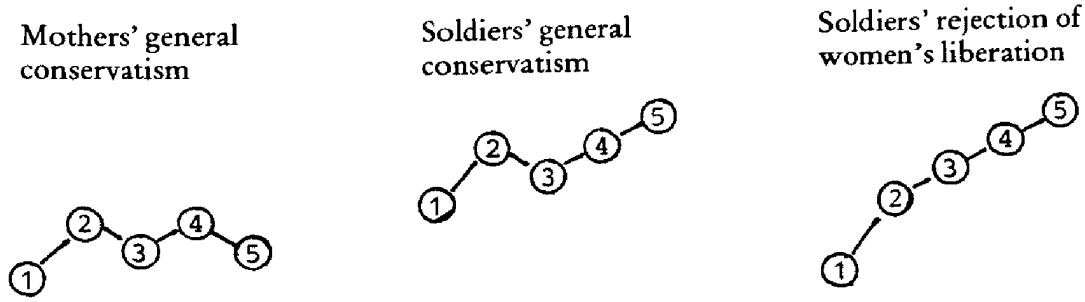

Figure 5
Schematic representation of change of conservative attitudes in women who bear their first child (between 2 and 3) and men who are recruited for the army (between 1 and 2)

Instrumental and Terminal Values

The four-values scores corresponding to the two-factor solutions of Rokeach's lists of instrumental and terminal values remained unchanged over time in the women giving birth to their first child. But there are significant changes in both of the "instrumental values" scores in the men recruited for the army: "Norm-

orientation" and "Openmindedness" clearly decreased during military service, with an improvement toward the end of the service time. Considering the lack of longitudinal control-group differences, these data seem to be interpretable (see Figure 6).

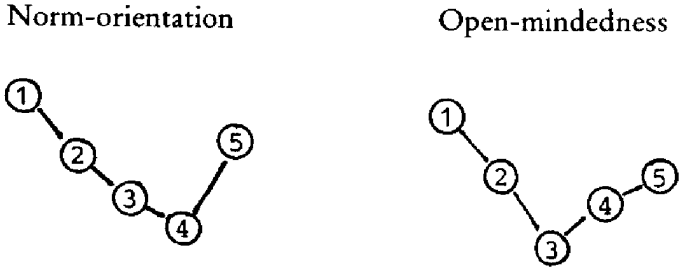

Figure 6
Schematic representation of "instrumental value" change in soldiers (recruitment between 1 and 2)

If we take the subjective event parameters into consideration as third variables, there are significant interactions with the repeated measurements of the value scores in only about five percent of the possible cases. It can be summarized that the cognitive third variables have no significant impact on value change in the time when the women's and men's everyday behavior is being changed by motherhood and recruitment, respectively.

In both samples some single values like "love" and "peace" keep their top positions in the hierarchy of values throughout the time studied, whereas others appear to have changed. As an example, the mothers' "Broadmindedness" first oscillates and then decreases, and for the soldiers "Obedience" is valued very low throughout military service but then rises in the value hierarchy when the army time is finished.

Change in Self-Concept

Multidimensional Self-Rating

In the sample of women bearing their first child no overall change in self-concept is indicated by MANOVA, so that only some obviously consistent tendencies like improved "social contact" after childbirth can be reported. In the soldiers, on the other hand, there is significant self-concept change over all subscales and also in the total self-concept score, indicating that the men's self-concept, especially "Self-confidence" and "Discipline" strongly deteriorated during military service. All self-concept measures decreased between the first to the third measurement (i.e., after the basic military training period) and then improved toward the end of the service time, as is shown in Figure 7.

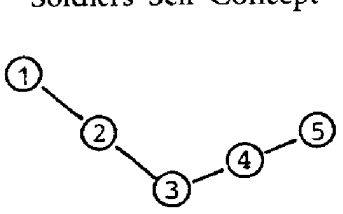

Figure 7
Schematic representation of self-concept change in men who are recruited for the army (between measurement points 1 and 2)

If we take the above-described cognitive third variables into consideration, there are significant interactions between the repeated-measurement and third-variables factors in about ten percent of the cases, and these effects are unsystematically distributed over the single cognitive variables and the different dependent measures of self-concept. As an example (see Figure 8) the young men's self-concept

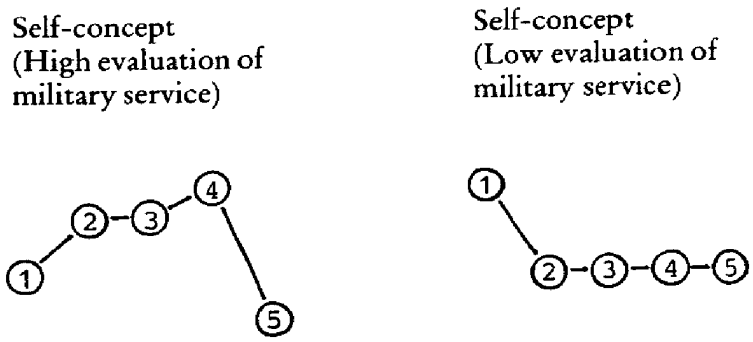

Figure 8
Schematic representation of the moderation of soldiers' self-concept change ("social contact") by their evaluation of military service

change with respect to social contact is moderated by their overall evaluation of recruitment: Soldiers who had evaluated army service as relatively high before recruitment show an N-shaped, those who gave recruitment a low evaluation an L-shaped decrease in their self-descriptions as being good in social contact. Only by taking the first three measurements into consideration does a significant interaction appear between the soldiers' frequency of returning home during military service and time of measurement on the overall self-concept score (which can be taken as an indicator of self-esteem). As Figure 9 shows, soldiers who frequently went home during the time shortly after recruitment (after the basic training period the frequency of home visits of all the men was high) produced much more favorable self-descriptions than those who returned less frequently; later on, all self-concept scores are equally low.

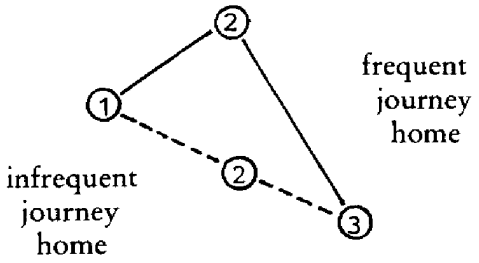

Figure 9
Schematic representation of the moderation of soldiers' self-concept change by their frequency of journey home during the first months of military service (second time of measurement)

Adjective Generation Technique

AGT data were obtained in mothers only, and they were interpreted supplementarily to the self-rating data. An inspection of the 507 self-attributed characteristics generated by the 55 women of the longitudinal group showed that some adjectives were more frequently used than others at the five times investigated (two before and three after childbirth): (1) balanced, quiet, anxious; (2) thoughtful, balanced, nervous; (3) quiet, patient, happy; (4) joyful, reliable, thoughtful; (5) active, friendly, tolerant. By associating each adjective with a favorability value according to the procedure of Allen and Potkay (1983), a self-concept or self-esteem score for each woman at each time of measurement was computed for their "real" as well as for their "ideal" self-concepts. While there was no overall significant differ-

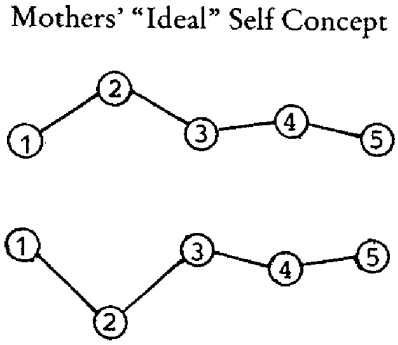

Figure 10
Schematic representation of mother's mean "ideal" and "real" self-concept scores (childbirth is between 2 and 3). Scores are derived from the *Adjective Generation Technique* by ratings of favorableness of self-attributed adjectives

ence between the single mean scores over time, the women's ideal/real discrepancy scores were shown to have significantly changed. Figure 10 demonstrates that ideal/real self-concept discrepancies are highest at the second point of measurement, i.e., shortly before the birth of the child.

Behavior-Attitude Correlations

Correlations of behavior (time spent for activities) and attitudes (evaluations of the activities) are generally low and rarely of interpretable magnitude. Only with respect to some selected attitude objects (e.g., "father" for women, and "girlfriend/wife" for men) are there correlations of the .40 to .50 order of magnitude. Ipsative behavior-attitude correlations (per individual over time) were higher than .75 (which does not mean a high degree of correlation in this case) only in about 20 percent of the cases. Thus, it can be summarized that there is a generally low level of behavior-attitude correlation when single behavior and attitude variables are considered.

The behavior-attitude link looks different when multiple correlations and the outcomes of canonical analyses are regarded. (Canonical correlation analyses were performed for each time of measurement, whereby activities/behaviors and evaluations/attitudes were grouped at different sides of the analysis – see Mummendey, Schiebel & Sturm, 1985b; multinormal distribution of the variables was inferred from normal distributions of the single variables.) The analyses were performed for sets of activities and interaction partners and revealed maximum canonical correlations of the .90 (activities) and .60 (interaction partners) order of magnitude for both samples. Again "father" and "mother" were the most predictable attitude objects in the women's, and "girlfriend/wife" in the men's group. Finally, canonical correlation analyses were performed for every single attitude or behavior object, whereby the five behavior measures were correlated with the five attitude measures. In the women bearing their first child, "Indolence" and "TV, music," in soldiers "Reading" and "Clubs" are the variables with the highest canonical correlation coefficients.

When multiple correlations were computed for the combined prediction of attitudes by behaviors and cognitive third variables, all correlation coefficients were in the .40 to .60 order of magnitude. In general, behavior is a much more powerful predictor of attitudes than any of the cognitive third variables if we consider all kinds of everyday leisure activities of mothers and soldiers. If we regard, on the other hand, those special activities that are directly related to either the child or the military situation itself (like baby care or firing practice), we find that the cognitive third variables contribute slightly more to the prediction of attitudes.

Causal Analysis

Finally, we attempted a description of behavior-attitude relationships by means of causal analyses. For clarity's sake, the behaviors of the mothers and soldiers

were clustered by computing composite scores including several activity items such as "Household," "Recreation," "Leisure at home," "Leisure outside home," and "Communication" for the mothers; and "Leisure alone," "Leisure with others," "Intellectual activities," "Physical activities," "Time spent with parents," and "Time spent with friend/partner" for the soldiers' group. Attitude scores included in the causal analyses were for both samples the direct evaluations of these behavior clusters as well as the four value factors "Norm orientation," "Open-mindedness," "Secure and pleasant life," and "Happiness and peace." Finally, the overall conservatism and self-concept scores were included.

Lag 1 Analyses

Correlations were computed for all measures at any time of measurement (t) and the respective measures following that time (t + 1). The coefficients of the resulting four correlation matrices were transformed into Fisher's z, combined, averaged, and retransformed. By this an average correlation matrix resulted in which the coefficients are based on $n = 4 \times 55 = 220$ pairs of data in the women's sample, and $n = 4 \times 47 = 188$ in the men's sample. The matrices were analyzed with Kenny's (1978) PANAL program. All data successfully passed the tests of stationarity.

For the mothers, behavior-attitude causations were demonstrated for "Recreation" and "Household" – attitudes toward these activity areas were caused by the time spent for the respective behaviors. In soldiers, more behavior-attitude causations were shown, e.g., "Leisure with others" causes the attitude toward leisure with others; "Physical activities" cause the respective attitude and the values concerning secure and pleasant life; other behavior-attitude causations concern "Intellectual activities" and "Time spent with friend/partner." On the other hand, there are several attitude-behavior relations: In the mothers, the attitude toward household activities also causes the respective behavior, norm-orientation values influence leisure activities at home, and two of the value factors affect the mothers' leisure behavior outside the home. For the soldiers, there are attitude impacts on behavior for "Leisure alone"; "Leisure with others" is caused by the self-concept; the time spent together with friends or a partner is caused by the leisure-alone attitude; and the degree of conservative attitude exerts a causal influence on the soldiers' intellectual activities.

In order to overcome the isolated view of only two variables each, and to study more complex causal relations, models of path analysis with directly measured variables (cf. Kenny, 1979) were applied. The analyses were restricted to two behavior variables in each model as well as five (for women) and four (for men) attitude and self-concept variables. By applying LISREL-V (Jöreskog & Sörbom, 1981), 25 causal hypotheses for the mothers' and 19 for the soldiers' sample were simultaneously tested. Figure 11 and Figure 12 show reduced models for the two lag 1 data sets for the mothers and soldiers.

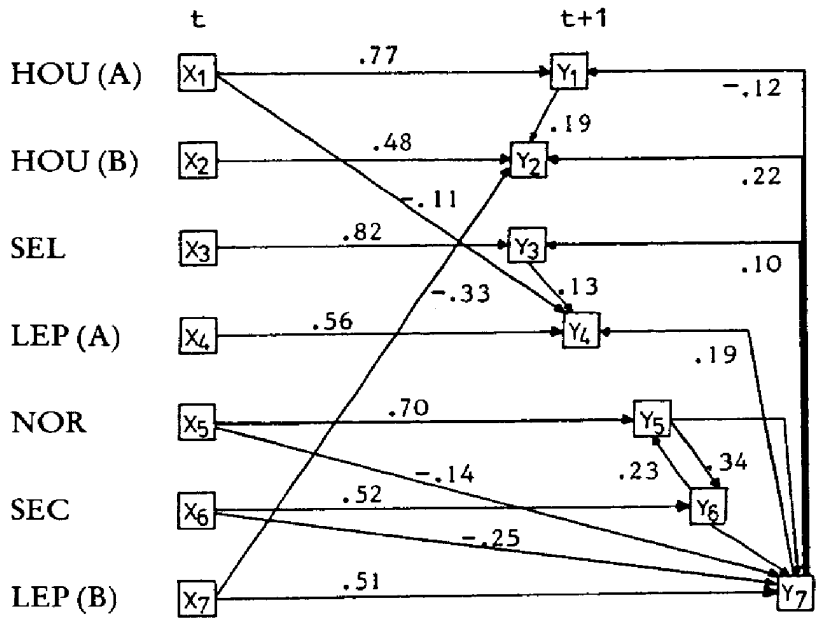

Figure 11

Schematic representation of the reduced path model for the mothers' sample (lag 1; n = 220) including two behavior variables, HOU(B) and LEP(B), the respective attitude variables, HOU(A) and LEP(A), the value-variables NOR and SEC, and the self-concept (SEL)

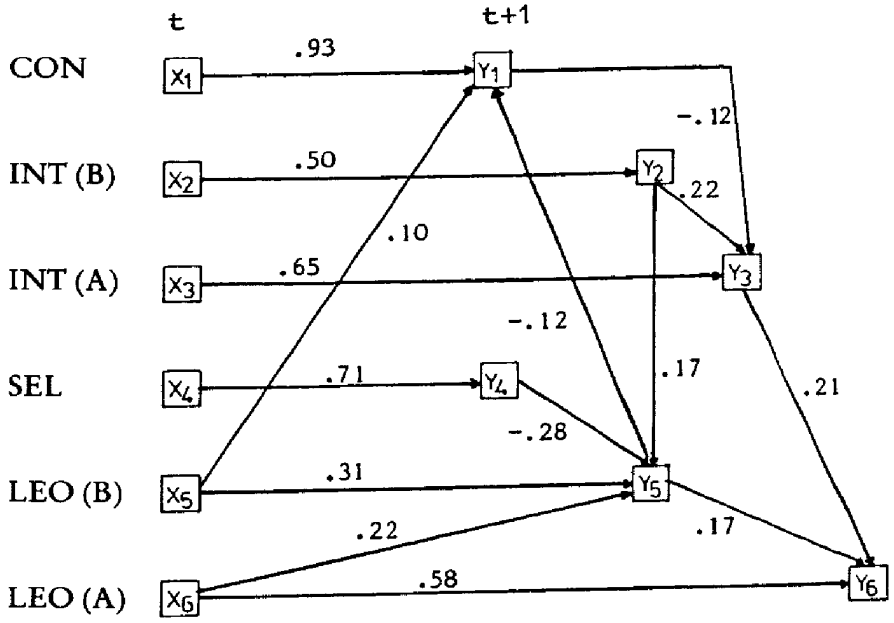

Figure 12

Schematic representation of the reduced path model for the soldiers' sample (lag 1; n = 188) including two behavior variables, INT(B) and LEO(B), the respective attitude variables, INT(A) and LEO(A), and the conservatism (CON) and self-concept (SEL) measurements

In general, the strongest causal effects are those exerted by variables at time t on themselves at time t + 1. In mothers there is an indirect influence of behavior on attitude, namely, from the behavior variable LEP(B) ("Leisure outside home") at time t via LEP(B) at t + 1 to the respective attitude variable LEP(A) at t + 1. But for the other behavior variable included, "Household" (HOU), the direction goes from attitude (A) to behavior (B) (see Figure 11).

In the soldiers, there are also some indirect influences of behavior on attitude variables that become apparent when total causal effects are decomposed. The behavior variable "Intellectual activities" INT(B) at time t causes this behavior at time t + 1, and this second behavior causes the respective attitude INT(A) at t + 1; similar effects are shown for "Leisure with others" (LEO).

Lag 2 Analyses

Correlations of all measures at any times t and the respective two points in time later (t + 2) were based on 141 pairs of data for the men and 165 for the women. There were some differences in the results of the PANAL and LISREL analyses between both of the samples, but, in total, it can be said that the models derived from lag 1 correlations explained also the lag 2 correlations.

In summary, there is no dominating causal influence of the behavior variables on the attitude and self-concept data. There are also reverse influences and, in some cases, interrelations of behavior and attitude variables (e.g., of the type "Attitude causes behavior, and behavior then causes attitude"). It seems plausible to assume that there are also complex interrelations of this kind in which different lag sizes are involved (e.g., "Attitude causes behavior with lag 2, and behavior then causes attitude with lag 1"). Further analyses should possibly treat the behavior scores as latent variables and consider single behaviors as indicators, or try to draw on larger samples of persons to describe behaviors and attitudes in causal models including more than two time levels.

Conclusion

Although only a short review of the first results of the study presented here has been given, it appears that behavior change has some impact on attitude change, but it also appears that there are complex behavior-attitude interrelations.

The terms "behavior" and "behavior change" have been used in two different meanings in this study. First, a set of specific activities, like housework in mothers or taking part in sports in soldiers, was observed, and the time spent for such specific activities served as a measure of specific behavior. It was shown that changes in behaviors of this kind correlate with changes in attitudes (evaluations) toward these behaviors. Second, the critical behavior-changing events (childbirth, recruitment) served as break-points at which large parts of the everyday life of the mothers and soldiers appeared to undergo change. Hence, attitude and self-con-

cept change in the women and men was expected to depend on the mere points of measurement. For both cases the results are not as clear as expected, and it becomes evident that many different kinds of mutual influence of attitudes and behaviors emerge.

Taking overt behavior as the origin of our analysis, we generally found only weak influences of cognitive variables. These variables, representing the subjects' subjective interpretation of motherhood or military service, were only partly shown to be efficient moderators of the behavior-attitude relation. If we consider the procedure of rating these subjective event parameters, it could be argued that a differentiation between cognitive event ratings and evaluative attitude ratings is difficult to make.

Some other methodological difficulties and weaknesses of the study reported result from its field-study character. For further data analyses a restriction of the manifold of variables should be envisioned. Alternative methodologies like applications of Markoff models to some selected behavior and attitude measures could be taken into consideration, but, on the whole, it seems to be difficult to apply rigorous methodology to longitudinal field-study data – better controlled experimental studies are indispensable.

Some of the results reported here are obviously more stable than others and represent clear behavior-attitude relations, e.g., the decrease and only gradual recovery of self-concept or self-esteem scores and the change of some values during military service. They appear to be reactions to far-reaching (negative) changes of the total life situation. The causal analyses reported show that it is not easy to describe such changes as caused by distinct variables; hence, there is probably an immense number of conjunctively operating influences which efficiently change a person's self-attitude but are not strong enough to be identified as a *single cause* of attitude change. In demonstrating effects of this kind, some advantages of field studies over experimentation in the area of attitude-behavior relations become apparent.

Finally, the results of our first analyses of individual attitude structures and their changes over a period of time show that it would be very promising to lay more stress on methodologies that study intraindividual change. Nearly all attitude-behavior research has been done in a "nomothetic" tradition of combining individual data. To overcome this "set" of attitude-behavior research, individual differences in the ongoing process of attitude-behavior interaction should be given more attention in social psychology.

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